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EXAMINER	
NGO, TANYA T	

ART UNIT	PAPER NUMBER
2613	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/562,760	WERNZ ET AL.	
	Examiner	Art Unit	
	TANYA NGO	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-28* is/are pending in the application.

4a) Of the above claim(s) *1-14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-18,20-22 and 27* is/are rejected.

7)☒ Claim(s) *19,22-26 and 28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 2/12/2010 have been fully considered but they are not persuasive.

Re claim 15, the applicant argues that claim 15 requires that at least one element has an optical path to be modified by an electrical dive signal which is not address by Ishida. However, the applicant discloses that prior art optical transmitters of phase shift keyed RZ signals comprise of laser that acts as a source for a carrier wave of constant power which is led through a phase-modulator 2 where phase shifts are keyed on it which correspond to information bits of binary, usually electrical communication signal DATA supplied to the phase modulator. Phase modulator comprises a waveguide section from a bi-refringent material such as lithium niobate, the index of refraction of which varies under the influence of an electrode supplied with the electric communication signal DATA, which can therefore assume two different level of the optical path length according to the level of the communication signal applied to it, paragraph [0002] of applicant's specification.

Ishida teaches that Mach-Zehnder interferometer 2, Fig. 2 contains "optical waveguides 19-1 and 19-2 on two routes and electrodes 20-1 to 20-3, 21-1 and 21-2 and disposed on an LiNbO3 substrate 13" lines 4-6, ¶ [0040]. Thus, the MZ-interferometer comprises optical waveguides or an optical waveguide section on lithium niobate substrate. The presence of these waveguides discloses the one element with an optical path length within the electro-optical modulator. Furthermore, Ishida discloses a Mach-Zehnder

interferometer type intensity modulator 2 can independently modulate (control) the phase of each optical path constituting the interferometer as show in Fig. 2 so that it can be used as an optical intensity modulator that carries out differential operation, ¶ [0040], lines 17-21. Hence, optical path present within the MZ-interferometer is modulated in order to perform intensity modulation. Lastly, also discloses that "the Mach-Zehnder interferometer type intensity modulator 2 receives a continuous wave (CW) light from the light source 1, generate an optical RZ-DPSK signal by intensity modulating the continuous wave (CW) light using the RZ differential signal, and outputs the optical RZ-DPSK signal to the optical fiber line" ¶ [0039], lines 14-20.

Thus, the CW light that is received from the interferometer would traverse the optical waveguides because they are the only element within the interferometer that propagates light. Furthermore, since the CW light is intensity modulated using the RZ differential signal to generate a RZ-DPSK signal , which is a phase shift keyed signal, and the CW light traverses the waveguides, which are optical path lengths within the interferometer, which are connected to electrodes 22-1 and 21-2, which are connected to the optical path lengths and are connected to a data input terminal and an inverted data input terminal. It would be obvious to one of ordinary skill in the art who would have the knowledge of the phase shift key modulator as disclosed by the applicant's admitted prior art to understand that the RZ differential signal, which is the driver signal, is used to modulate the CW light that traverse the optical waveguides, which are optical path lengths, wherein the optical waveguides are coupled to electrodes, Fig. 2, and are connected to a data terminal, results in the index of

refraction varying the waveguide and adjusting the optical path length. This reads upon the limitation of an electro-optical modulator having at least one optical element with an optical path length adapted to be modified by a driver signal.

Lastly, Ishida discloses in the abstract that the RZ encoder generates an electric differential signal. Hence, this furthers the understanding that Ishida does discloses the limitation of an electro-optical modulator *(MZ interferometer, 2, Fig. 1)* having at least one element with an optical path length *(optical waveguides 19-1 and 19-2 in Fig. 2, which is a further disclosure of the MZ-interferometer in Fig. 1)* modified by an electrical diver signal *(the RZ differential signal, which is an electric driver signal, is used to modulate the CW light that traverse the optical waveguides, which are optical path lengths that are modified by electrodes supplied with said driver signal, RZ differential signal)*.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 15 and 16 rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida et al (herein Ishida) US PG PUB 2006/0245763 and Miyamoto et al (herein Miyamoto) US Patent 6,865,348.

Re claim 15, Ishida discloses a transmitter for an optical RZ-DPSK communication signal *(Fig. 1)*, comprising:

a) a source for an optical carrier *(1, light source, Fig. 1)*;

b) an electro-optical modulator *(2, Mach-Zehnder interferometer type intensity modulator)* having at least one element with an optical path length adapted to be modified by an electrical driver signal for intensity modulating the optical carrier based on the driver signal *(The MZ interferometer is further disclosed in Fig. 2, where the light is input from the left end, and the RZ-DSPK is output from the right end. The optical electrode 21-1 is connected to the data input terminal and the electrode 21-2 is connected to an inverted data input terminal 18, and will modulate the phase of each optical path, paragraph [0040])* ; and

c) a driver circuit *(RZ encoder 4, Fig. 1)*for generating the driver signal from an electrical communication signal *(the RZ encoder is fed electrical signals D and E, where are the positive phase, and reversed phased differential signal, Fig. 3, and outputs two signals, which comprise the driver signal G and F)*, the driver signal being an impulse-type signal having impulses of two types *(the driver signals F and G, are both impulse signals, Fig. 4, and have two impulse types, a positive phase RZ differential signal, F, Fig. 4, and a reversed phase RZ differential signal, G, Fig. 4)*spaced in time by a neutral signal state *(between all of the pulses, the pulse always returns to a neutral state, or zero, Fig. 4)*, and wherein during the neutral signal state of the driver signal, a transmission of the modulator becomes zero *. Furthermore, their intensities both return to zero between each pulse, therefore)*, and the two

types of impulses cause the transmission of the modulator to be different from zero and a phase shift which is specific for each type of the impulses *(the two signals are output from the RZ encoder 4, to the MZ interferometer, which outputs signal H, Fig. 3, which is further disclosed in Fig. 4, that the two types of impulses cause the output of the modulator to be different from zero to a phase shift for each type of impulse)*.

Ishida does not appear to explicitly disclose wherein the impulses of the two types have opposite signs. However, Miyamoto discloses an optical transmission system, Fig. 11A, in which the optical signal that was output from the modulator *(7, Fig. 11A, which comprises of a MZ optical intensity modulator 71, Fig. 11A, Col. 12, lines 62-34)* varied between the phase of 0 and π *(signal P11 is the output of the optical modulator 7, Fig. 11A wherein signal P11 is further disclosed in Fig. 14C as alternating between phases of 0 and π)* and that the driving signal *(P10, Fig. 11A further disclosed in Fig. 13B)* is disclosed has having two different signal, where the driving signal P10 is a duo binary RZ electrical signal *(Col. 19, lines 35-36)*. Ishida and Miyamoto are analogous art because they are from the same field of endeavor, optical transmission and modulator on an RZ electrical signal. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Ishida and Miyamoto before him or her, to be able to interpret or understand that the two output signals of the RZ encoder of Ishida, signals F and G in Fig. 4 comprise of opposite signs like the electrical RZ signal of Miyamoto.

Re Claim 16, Ishida and Miyamoto disclose all the elements of claim 15, which claim 16 is dependent upon. Furthermore, Ishida discloses in that the specific phase shifts differ by π *(Fig. 4, Signal H, paragraph [0046])*.

Re claim 20, Ishida and Miyamoto disclose all the elements of claim 15, which claim 20 is dependent upon. Ishida discloses in that the driver circuit comprises a difference circuit *(the RZ encoder 4, Fig 1 is directly connect to a differential encoder 3, Fig. 1)* for forming a pre-coded signal *(the differential encoder generate a differentially encoded signal based on the Data signal, paragraph [0030]. Since the output of the differential encoder is the input signal of the RZ encoder, Fig. 1, the encoded output of the differential encoder is considered the pre-coded signal)*, representative of a difference between subsequent bits of the electrical communication signal, and the driver signal is derived from the pre-coded signal *(the differential encoder comprises of a exclusive OR circuit, Fig. 3, that receives the data signal, which is the present data bit, and an input from a one-bit delay circuit, which sends the bit prior to the present data bit. The exclusive OR circuit compares the bit and will output a "high" signal if the two subsequent bits are different and a "low" signal if the two subsequent bits are the same. Therefore the signal being output from the XOR circuit is representative of a difference between subsequent bits of the communication signal)*.

4. Claims 17 - 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida and Miyamoto as applied to claim 15 above, and further in view of Winzer US PG PUB 2003/0007231 A1 and Singh et al (herein Singh) US Patent 6,185,345.

Re claim 17, Ishida and Miyamoto disclose all the elements of claim 15, which claim 17 is dependent upon. Ishida and Miyamoto disclose in that the modulator is an interferometer having arms *(Ishida discloses that the modulator is a Mach-Zehnder Interferometer, 2, Fig. 1, which has two arms, Fig. 1)*. Ishida and Miyamoto do not appear to explicitly disclose in which the optical path length of at least one of the arms is controllable by the driver signal, and in which a neutral signal level corresponds to a path length difference between the arms of half of a carrier wavelength of the optical carrier. However, Winzer discloses an RZ optical signal generator *(Fig. 1)*, that includes a delay-line interferometer *(115, Fig. 1)* such that one of the interferometer arms 116 includes an adjustable delay element 117 which is arranged to control the amount of delay introduced into the optical signal in each interferometer arm with respect to the other *(paragraph [0010])* wherein the delay will determined the duty cycle and the neutral signal of the cycle. Ishida, Miyamoto, and Winzer are analogous art because they are from the same field of endeavor, optical modulation of RZ pulse. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Ishida, Miyamoto and Winzer before him or her, to modify the interferometer of Ishida and Miyamoto to include the delay element of Winzer because it allow the individual with implement a desired duty cycle in the provided RZ pulses *(paragraph [0010])*, which enables better synchronization.

Winzer does not appear to explicitly disclose that they delay difference is implemented by a difference in path length. However, Singh discloses the implementation of variable delay in a Mach-Zehnder interferometer is implemented by affecting the relative

optical path length between the first and second optical waveguides. Winzer, Ishida, and Singh are analogous art because they are from the same problem-solving area, implementing a variable delay in a Mach-Zehnder interferometer. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Wizner, Ishida and Singh before him or her, to understand the delay element of the Mach-Zehnder interferometer of Winzer and Ishida to as a variation of the relative optical path length between the first and second waveguides in the Mach-Zehnder interferometer *(Col. 11, lines 11-17)*.

Re claim 18, Ishida, Miyamoto, Winzer, and Singh disclose all the elements of claim 17, which claim 18 is dependent upon. Furthermore, Ishida discloses two conductors are used for transmitting the driver signal *(electrodes 21-1 and 21-2, further disclosed on Fig. 2, are connected to the RZ encoder, which outputs the driver signal, according to Fig. 1)*, wherein the impulses of a first type are transmitted on a first of the conductors, and wherein the impulses of a second type are transmitted on a second of the conductors *where optical electrode 21-1 is connected to the data input terminal 17, and electrode 21-2 is connected to an inverted data input 18, paragraph [0040])*.

Re claim 19, Ishida, Miyamoto, Winzer, and Singh disclose all the element 18, which claim 19 is dependent upon. Winzer discloses various arrangements for interferometer 115 will be apparent to person skilled in the art, including two separate delay elements, one in each interferometer arm, that each provide one of the coarse and fine delays described above, wherein one may be fixed and the other adjustable or controllable, paragraph [0013]. Winzer

does not explicitly disclose that the two arms each comprise of a controllable optical path length. However, at the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Winzer before him or her, to modify the interferometer of Winzer and Ishida to have both delays or optical path length adjusters controllable because each delay provides either coarse or fine delay, paragraph [0013], and it would allow the user to control the coarse delay independently from the fine delay of the system.

Naturally flowing from the combination, since there is a delay element in each as, as disclosed by Winzer, and a conductor in each arm, as disclosed by Ishida. There is delay in one arm will be connected to the conductor present in said arm because they are both connected to the same optical path.

5. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida and Miyamoto as applied to claim 20 above, and further in view of Roberts et al (herein Roberts) US Patent 4,975,595.

Re claim 21, Ishida and Miyamoto disclose all the elements of claim 20, which claim 20 is dependent upon. Ishida discloses the difference circuit comprises an XOR-gate *(32, Fig. 3)* and a one bit delay circuit, *(31, Fig. 3)*. Ishida does not appear to explicitly disclose and a flip-flop along with the XOR-gate. However, Roberts discloses a well known in the art of electronic circuits are D-type flip flop is a binary devoiced used to provide a one-bit delay. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Ishida and Roberts before him or her, to modify the differential

encoder of Ishida to include the D-type flip flop of Roberts as the one-bit delay device because a flip-flop is a well known device that is able of providing a one bit delay in logical circuits *(Col. 1, lines 26-34)*, and due its wide application and common use, it is also cost effective.

6. Claim 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida and Miyamoto as applied to claim 15 above, and further in view of Winzer US PG PUB 2003/0007231.

Re claim 27, Ishida and Miyamoto disclose all the elements of claim 15, which claim 27 is dependent upon. Ishida and Miyamoto do not appear to explicitly disclose and a control means for varying a ratio between duration of the impulses and duration of the neutral signal state. However, Winzer discloses Winzer discloses an RZ optical signal generator *(Fig. 1)*, that includes a delay-line interferometer *(115, Fig. 1)* such that one of the interferometer arms 116 includes an adjustable delay element 117 which is arranged to control the amount of delay introduced into the optical signal in each interferometer arm with respect to the other *(paragraph [0010])* wherein the delay will determined the duty cycle *(Claim Text 3)*, which is the ratio or fraction of the pulse duration and the duration of the neutral signal. Ishida, Miyamoto, and Winzer are analogous art because they are from the same field of endeavor, optical modulation of RZ pulse. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Ishida, Miyamoto and Winzer before him or her, to modify the interferometer of Ishida and Miyamoto to include

the delay element of Winzer because it allow the individual with implement a desired duty cycle in the provided RZ pulses *(paragraph [0010])*, which enables better synchronization.

Re claim 28, Ishida, Miyamoto, and Winzer disclose all the elements of claim 27, which claim 28 is dependent upon. Furthermore, Ishida discloses a clock signal being input into the RZ encoder, which is the control means of the modulator that varies the duty cycle according to the prior rejection. Ishida, Miyamoto, and Winzer do not explicitly disclose that a mono-flop is located in the clock link of the driver circuit. However, it would have been obvious to one of ordinary skill in the art as a matter of design choice to include a mono-flop in the clock line.

Allowable Subject Matter

7. Claims 22- 28are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened

statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TANYA NGO whose telephone number is (571) 270-7488. The examiner can normally be reached on M - F from 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngo/

April 5, 2010

/Kenneth N Vanderpuye/
Supervisory Patent Examiner, Art Unit 2613